
BNUTRITION
BIMBO
GB
MICRONUTRIENT
fortification


BNUTRITION
BIMBO

INDEX

GB NUTRITIONAL LANDSCAPING

CONTEXT

Malnutrition around the world

Access to adequate food that provides the energy and nutrients necessary for the optimal development of people is a great challenge at a global level. Food insecurity affects around 2 billion people in the world at the same time that 2 billion adults and 380 million children and adolescents face problems such as overweight and obesity.

Malnutrition affects 1 in 3 people globally. This represents a significant impact not only on people's health and wellbeing, but also has social and economic repercussions, estimating that malnutrition has a global economic cost of approximately 3.5 trillion USD per year. Noncommunicable diseases related to poor diets are the leading causes of death and disability worldwide [6]. Being such a complex problem, its solution must have a multifactorial approach where different actors are involved.

According to the World Health Organization, malnutrition refers to "deficiencies, excesses and imbalances in a person's caloric and nutrient intake." It ranges from undernutrition that includes emaciation, growth retardation, underweight, and vitamin and mineral deficiencies; as well as overweight, obesity and related non-communicable diseases. Undernutrition refers not only to a lack of nutrients, but it is also a combination of diverse factors, insufficient intake of energy, protein and micronutrients exacerbated by infections or diseases. This type of malnutrition stunts children's growth, deprives them of essential vitamins and minerals, and makes them more susceptible to frequent and serious illnesses and infections.

Companies collect and analyze publicly available information from local governments and international health authorities on specific dietary gaps in the developing world to focus their efforts on developing foods that can address these gaps. This process reveals where there is a need for micronutrients, including iron. Zinc, vitamin A and vitamin D.

Micronutrient deficiencies

Overall, 2 billion people in the world are estimated to be deficient in key vitamins and minerals. particularly: vitamin A. iodine. iron and zinc. Most of these people live in low-income countries and are typically deficient in more than one micronutrient. Deficiencies occur when people do not have access to micronutrient-rich foods such as fruit. Vegetables, good sources of proteins and fortified foods. Usually because they are too expensive to buy or locally unavailable. If micronutrient requirements cannot be met through dietary intake there are three key additional strategies which can be used to address deficiencies: Supplementation, fortification and biofortification.

THE BIG MICRONUTRIENT DEFICIENCIES

Anaemia

Anaemia is a public health problem that affects populations in both rich and poor countries. Although the primary cause is iron deficiency, it is seldom present in isolation. More frequently it coexists with several other causes, such as malaria, parasitic infection, nutritional deficiencies and haemoglobinopathies.

Anaemia is defined as a hemoglobin concentration below a specified cut-off point, which can charge according to the age, gender, physiological status, smoking habits and altitude at which the population being assessed lives. This problem is associated with increased risks for maternal and child mortality. Iron-deficiency anaemia reduces the work capacity of individuals and entire populations, with serious consequences for the economy and national development. In addition, the negative consequences of iron-deficiency anaemia on the cognitive and physical development of children and on physical performance-particularly the work productivity of adults-are major concerns. The numbers are staggering about 25% of the world's population are anemic, many because of iron deficiency; in resource-poor areas, the number is frequently exacerbated by infectious diseases.

The main risk factors for iron-deficiency anaemia include a low dietary intake of iron or poor absorption of iron from diets rich in phytate or phenolic compounds. Populations groups with greater iron requirements, such as growing children and pregnant women, are particularly at risk. Overall, the most vulnerable, poorest and least educated groups are disproportionately affected by iron-deficiency anaemia.

Anaemia

- 2 billion people are anaemic, mainly because of a lack of iron in the diet.
- 468 million non-pregnant women are anaemic globally.

The population most at risk are:

- Pregnant women, infants and pre-school children are particularly at risk.
- 50% of pregnant women in devoloping countries are estimated to be anaemic.
- 40% of pre-school children in developing countries are estimated to be anaemic.

VITAMIN A DEFICIENCY

Vitamin A deficiency results from inadequate dietary intake of vitamin A to satisfy physiological needs. It may be exacerbated by high rates of infection, especially diarrhea and measles. It is common in developing countries but rarely seen in developed countries.
Vitamin A deficiency is a public health problem in more than half of all countries. Vitamin A deficiency can be defined clinically or sub-clinically.

Night blindness is one of the first signs of vitamin A deficiency. In its more severe forms, vitamin A deficiency contributes to blindness by making the cornea very dry and damaging the retina and cornea. An estimated 250 000-500 000 vitamin A-deficient children become blind every year and half of them die within 12 months of losing their sight. Vitamin A deficiency also contributes to maternal mortality and other poor outcomes of pregnancy and lactation. Furthermore, it diminishes the ability to fight infections. Even mild, subclinical deficiency can be a problem, as it may increase children's risk for respiratory and diarrheal infections, decrease growth rates, slow bone development and decrease the likelihood of survival from serious illness.

Vitamin A

- Vitamin A Deficiency
  250 million pre-school children are vitamin A-deficient, because of this children go blind every year.
- Why do you need vitamin A?
  For growth and development
- What it you don't get enough?
  Impaired vision and night blindnes
  Inmune system could be weakened
  Young child are in great risk of illness and even death

VITAMIN D DEFICIENCY

Vitamin D plays a key role in bone metabolism, participating in cell differentiation and proliferation, as well as in muscle function and balance. Vitamin D deficiency leads to deformations in the bones making them weaker and prone to fractures. When the deficiency occurs in children, the disease is called Rickettsia and in adults Osteomalacia. In the case of children, they include enlargement of the head, joints, and rib cage; deformed pelvis and bowed legs. In adults, it is characterized by poor calcification of newly synthesized bone, resulting in fractures of the hip, spine, and other bones.

In recent years, other functions that Vitamin D has in the body have been found in addition to its role in bone health. Vitamin D plays an important role in endocrine, paracrine, and autocrine activities, being able to reduce the risk of many chronic diseases such as colon cancer, breast cancer, cardiovascular diseases, diabetes mellitus, multiple sclerosis, rheumatoid arthritis, Parkinson's disease, tuberculosis, etc.

It is estimated that the body requires approximately 3,000 to 4,000 IU (75-100mcg) of vitamin D to maintain optimal levels of 25-OH vitamin D3. Vitamin D is obtained mostly through sun exposure and to a lesser extent through food sources such as fatty fish, cod liver oil, milk, and fortified cereals.

Vitamin D deficiency has gained particular relevance globally. Although deficiencies are common in countries with low sunlight exposure or in people with dark skin, prevalence has been reported in people with comorbidities or with habits that restrict their exposure to UV light (use of sunscreens, indoor activities, use of clothing that limits exposure), among others.

Vitamin D

Approximately 1 billion people worldwide are affected with vitamin-D deficiency and around 50% of the global population have vitamin D insufficiency.

Who are more susceptible to vitamin D deficiencies?

People who are obese, who have dark skin, who are older than age 65 and who have little sun exposure.

ZINC DEFICIENCY

Zinc deficiency is largely related to inadequate intake or absorption of zinc from the diet, although excess losses of zinc during diarrhea may also contribute. The distinction between intake and absorption is important: high levels of inhibitors (such as fibre and phytates) in the diet may result in low absorption of zinc, even though intake of zinc may be acceptable. For this reason, zinc requirements for dietary intake are adjusted upward for populations in which animal products—the best sources of zinc—are limited and in which plant sources of zinc are high in phytates.

Severe zinc deficiency was defined in the early 1900s as a condition characterized by short stature, hypogonadism, impaired immune function, skin disorders, cognitive dysfunction and anorexia. Using food availability data, it is estimated that zinc deficiency affects about one-third of the world's population, with estimates ranging from 4% to 73% across subregions. Although severe zinc deficiency is rare, mild-to-moderate zinc deficiency is quite common throughout the world.

Worldwide, zinc deficiency is responsible for approximately 16% of lower respiratory tract infections, 18% of malaria and 10% of diarrheal disease.

In total 1.4% (0.8 million) of deaths worldwide were attributable to zinc deficiency: 1.4% in males and 1.5% in females. Attributable dalys were higher with zinc deficiency accounting for about 2.9% of worldwide loss of healthy life years.

Zinc

- Zinc deficiency
- Generally realed to poor absorption or intake of zinc from your diet

Why do you need zinc?

- Its essential for maintaining our inmmune system healthy and for growth and development of chikdren

OUR COMMITMENT

Launch fortified products to address under-nutrition through micronutrient fortification focus on Iron, Zinc and Vitamin A deficiency.

DEVELOPING PRODUCTS THAT HELP COVER NUTRITIONAL DEFICIENCIES.

Adequate food intake and nutrition are the basis for survival, health and human being´s growth in optimum conditions. Therefore it's important for us to invest in the short, medium and long terms through the development of products aimed to benefit the current and future generations with nourishment deficiencies.

In Grupo Bimbo we understand that one of the most effective ways of helping to satisfy the health and nutritional needs of the community is to develop actions related to strengthening or enriching the food we consume widely, such as bread.

As part of our commitments to offer delicious and nutritious foods for everyone, GB has developed a rigorous methodology for Nutritional Landscaping and set the guidelines for creating products that can address the nutrition gaps for vulnerable populations.

Under our main strategy "Nourishing a better world", the area of Global Nutrition Sciences has developed 4 platforms of action that contributes to the health and nutrition of our consumers:
If micronutrient requirements cannot be met through dietary intake there are three key additional strategies which can be used to address deficiencies:

- **Supplementation:** A substance or product that is added to a person's diet to make sure they get all the nutrients they need. It may include vitamins, minerals, protein, or fat.
- **Food fortification:** fortification involves the addition of small amounts of micronutrients to food products often commonly consumed by the general populations (such as cereals, wheat flours and rice)
- **Biofortification**

As part of our commitments to offer delicious and nutritious foods for everyone, GB has developed a rigorous methodology for Nutritional Landscaping and set the guidelines for creating products that can address the nutrition gaps for vulnerable population.

GB NUTRITIONAL LANDSCAPING

· Fundamentals

This tool considers the international and local dietary guidelines and recommendations based on science

- General Principles for the Addition of Essential Nutrients to Foods (CXG-9-1987), CODEX Alimentarius.
- Guidelines on food fortification with micronutrients, WHO/FAO
- Local nutrition surveys performed by sanitary and government authorities.
- Local Dietary Reference Values (DVR)

Our method

- Identify dietary needs both geographically and within a specific population group to promote launching new products with the micronutrients needed.
- Generated easy-to know Country profiles.
- Develop and update global nutritional guidelines based on micronutrient fortification and bring together nutrition-related indicators in standardized form.
- Track changes over time and monitor progress in a specific population.

OUR METHOD

1. Data Research

Includes the identification of publicly disclosed official reports per country.
And the research of additional papers to hace as many information as possible.

2. Information Analysis

Analyze the micronutrient-related information and create a chart of micronutrient deficiency and policies or programs.

3. Country Profile

Create a summary that contains Country description including back-ground, location, population, prevalence of malnutrition and a technical analysis of wheat flour fortification.

4. Guidelines

Develop products focused on covering micronutrient deficiencies based on local needs.
The products developed must be staple foods with a score of at least 3 stars based on the HSR methodology and be classified in the daily consumption portfolio.

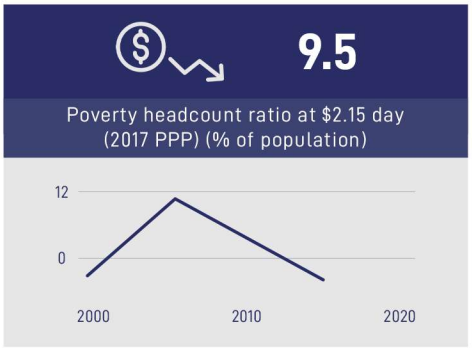
COUNTRY PROFILES

Based on the Global Hunger Index (GHI), we identify the countries with the highest score and then create a working plan based on the GB presence to study the micronutrient deficiencies, also the products available in the region.
In 2019 we´ve started with the developing countries in America with higher (GHI) that showed a need to cover nutrition.

GHI	COUNTRY
20.6	Guatemala
16.9	Venezuela
12.9	Honduras
11.3	Ecuador
9.6	El Salvador
8.8	Panama
8.3	Peru
6.7	Paraguay
6.2	Mexico

ANEX 1.
GUATEMALA

Poverty



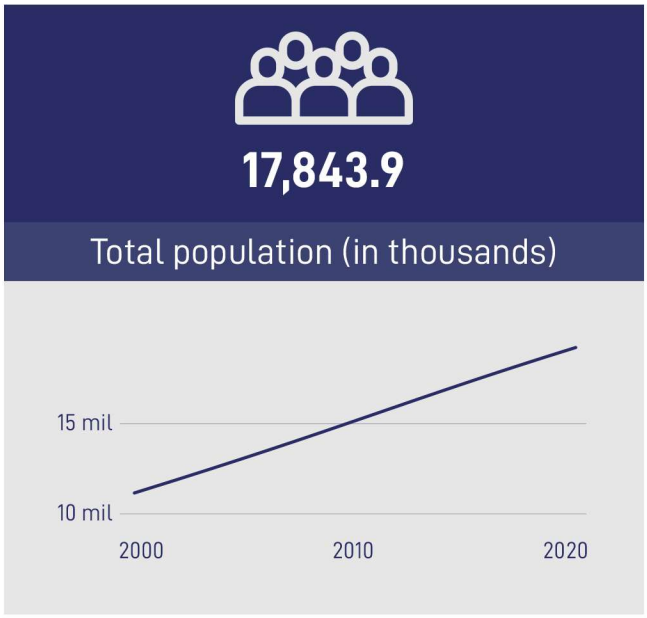
Global Hunger Index for children under 5 2022:
Moderate 18.8

Burden of malnutrition

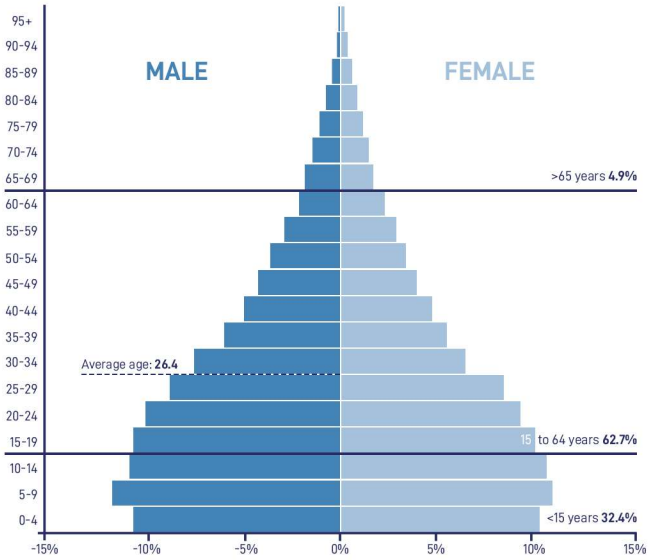
According to the 2022 Global Nutrition Report, Guatemala is:

- Some progress in achieving the target for stunting, but there are still many children affected and on course for wasting.
- On course for the prevention of the increase in the prevalence of overweight children under 5 years of age.
- On course in reducing anaemia among women of reproductive age.
- Limited progress in achieving the diet-related non-communicable disease targets.
- No progress in achieving the target for obesity of adults, however Guatemala's obesity prevalence is lower than the regional average.

Total population



Demographics



GUATEMALA

Nutrition indicators

AGE	INDICATOR	% PREVALENCE	YEAR
Children <5 years	Stunting Wasting Overweight	42.8 N/A 5.1	2020
Adolescents 10-19 years	Obesity	8.4	2016
Adults	Overweight + obesity	55.9	2016

Guatemala has the highest prevalence of stunting in Latin America.
On the other side, Guatemala has one of the lowest rates of overweight in children under five years.

Prevalence of micronutrient deficiencies

NUTRIENT	AGE	INDICATOR	% PREVALENCE	YEAR
Iron	Children <5 years	Deficiency	11	2013-16[6]
	Pregnant women	Anemia	12.7	2019
	Women of reproductive age	Anemia	16.0	2013-16[6]
Vitamin A	Children <5 years	Deficiency Night blindness	0.0 0.5	2013-16[6] 2005
	Pregnant women	Deficiency Night blindness	1.1 6.8	2005 2005
	Women of reproductive age	Deficiency	0.0	2013-16[6]
Zinc	Children <5 years	Deficiency	25.0	2013-16[6]
	Woman of reproductive age	Deficiency	25.0	2013-16[6]
	Total Population	Deficiency	29.8	2005
Vitamin B_{12}	Children <5 years	Deficiency	20.0	2013-16[6]
	Women of reproductive age	Deficiency	15.0	2013-16[6]
Vitamin D	Woman of reproductive age	Deficiency	0.0	2013-16[6]

Guatemala has one of the lowest levels of prevalence of anaemia in women of reproductive age, with the largest progress in the reduction (67 %) from 2000 to 2019.

GUATEMALA

Hidden Hunger Index for children under 5 2009
29.7

Food insecurity
The prevalence of moderate or severe food insecurity is 49.7 percent, showing a rise of more than 4 percentage points in recent years.

Adequacy of dietary intakes of key foods in adults aged 20 years and over

FOOD GROUP	% DIETARY RECOMMENDATIONS		
	BELOW	ACCORDINGLY	ABOVE
Fruits	38		
Vegetables	31		
Legumes	46		
Nuts	10		
Whole grains	18		
Fish	22		
Dairy	74		
Red meat			>200

National Nutrition Policies

Food-based dietary guidelines	Legislation for mandatory salt iodisation	Sugar-sweetened beverage tax	Policy to reduce salt/sodium consumption	Policy to limit saturated fatty acid intake
YES	YES	YES	YES	YES

Policy to eliminate industrially produced trans fatty acids	Policy to reduce the impact of marketing of foods and beverages high in saturated fats, trans fatty acids, free sugars, or salt on children	Opeational policy, strategy, or action plan to reduce unhealthy diet related to non-communicable diseases	Opeational, multisectoral policy, strategy or action plan for non-communicable diseases	Opeational policy, strategy or action plan for diabetes
YES	YES	YES	YES	YES

GUATEMALA

Government/public sector programs for fortification of foods

Food product	Fortificant nutrients	Mandatory	Non mandatory
Salt	iodine	x	
Wheat flour	folate, iron, nniacin (B_3), riboflavin (B_2), thiamin (B_1), Vitamin D	x	
Maize flour	folate, iron, nniacin (B_3), riboflavin (B_2), thiamin (B_1), Vitamin D	x	
Rice			x
oil			x

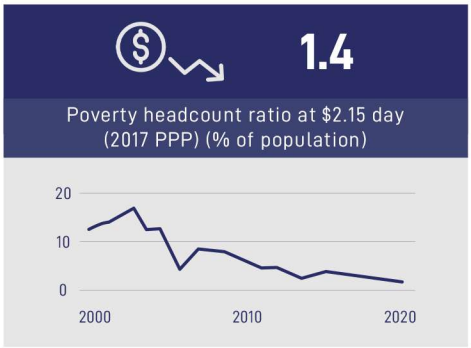
GUATEMALA

Fortification of specific foods

NAME OF PRODUCT	FORTIFICANT NUTRIENTS	TARGET POPULATION
Vitacereal	Vitamins A, C, D, E, B1, B2, B3, B5, B6, B7, B12, folic acid, iron, zinc, iodine, calcium.	Pregnant women, nursing mothers and children aged between 6 and 35 months living in municipalities with malnutrition rates above 65%
Super Cereal plus (My little food)	Vitamins A, C, D, E, B1, B2, B3, B5, B6, B7, B12, folic acid iron, zinc, iodine, calcium, potassium, phosphorus, magnesium, copper, manganese, selenium	Children 0–2 years old, pregnant and lactating women in the districts of Totonicapán, Sololá and Chimaltenango
Incaparina	Vitamins A, D, K, B1, B2, B3, B12, folic acid, iron, zinc, iodine, calcium	N/A
Bienestarina	Vitamins A, B1, B2, B3, B12, folic acid, iron, zinc, calcium	N/A
Peanut	vitamins A, C, D, E, B1, B2, B5, B6, B12, folic acid, iron, zinc, iodine, calcium, potassium, phosphorus, magnesium, copper, manganese, selenium	N/A

EL SALVADOR

Poverty



Global Hunger Index for children under 5 2022:
low 8.4

Burden of malnutrition

According to the 2022 Global Nutrition Report, El Salvador is:

- On course for stunting and wasting, but there are still children affected.

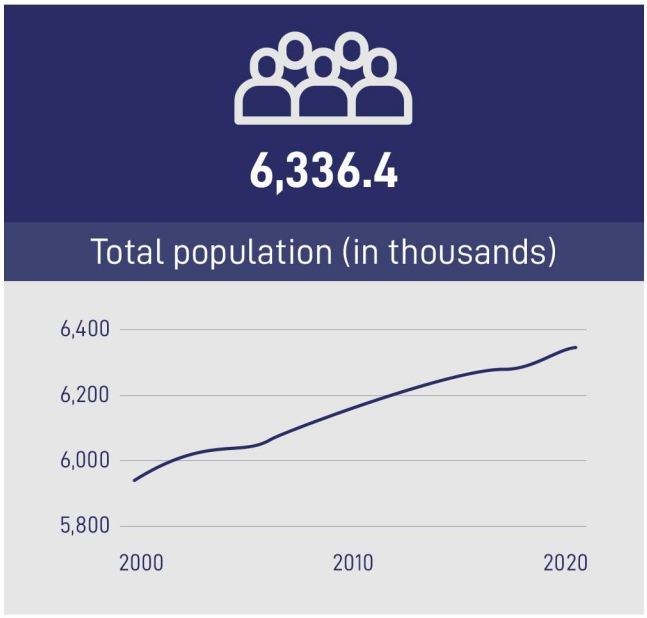
- On course for the prevention of the increase in the prevalence of overweight children under 5 years of age.

- No progress in reducing anaemia among women of reproductive age.

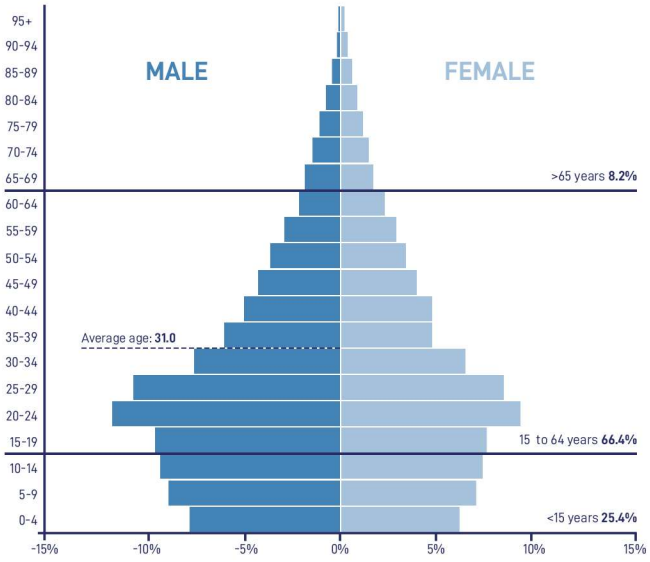
- Limited progress in achieving the diet-related non-communicable disease targets.

- No progress in achieving the target for obesity of adults, with a higher prevalence than the regional average for women but lower for men.

Total population



Demographics



EL SALVADOR

Nutrition indicators

AGE	INDICATOR	% PREVALENCE	YEAR
Children <5 years	Stunting Wasting Overweight	11.2 N/A 6.6	2020
Adolescents 10-19 years	Obesity	10.3	2016
Adults	Overweight + obesity	59.9	2016

El Salvador has shown improvements in undernourishment figures by -2.1 percentage points, with reductions greater than 50 percent over recent years.

Prevalence of micronutrient deficiencies

NUTRIENT	AGE	INDICATOR	% PREVALENCE	YEAR
Iron	Children <5 years	Deficiency	24.6	2010[6]
	Pregnant women	Anemia	15.9	2019
	Women of reproductive age	Anemia	10.6	2019
Vitamin A	Children <5 years	Deficiency Night blindness	14.6 0.5	2010[6] 2005
	Pregnant women	Deficiency Night blindness	1.7 4.3	2005 2005
Zinc	Children <5 years	N/A	N/A	N/A
	Total Population	Deficiency	10.7	2005
Vitamin B_{12}	Children <5 years	Deficiency	-	-

Hidden Hunger Index for children under 5 2009

14.3

Food insecurity

The prevalence of moderate or severe food insecurity is 47.1 percent, showing a rise of more than 4 percentage points in recent years.

EL SALVADOR

Adequacy of dietary intakes of key foods in adults aged 20 years and over

FOOD GROUP	% DIETARY RECOMMENDATIONS		
	BELOW	ACCORDINGLY	ABOVE
Fruits	62		
Vegetables	43		
Legumes	36		
Nuts	13		
Whole grains	19		
Fish	37		
Dairy		98	
Red meat			>200

National Nutrition Policies

Food-based dietary guidelines	Legislation for mandatory salt iodisation	Sugar-sweetened beverage tax	Policy to reduce salt/sodium consumption	Policy to limit saturated fatty acid intake
YES	YES	YES	YES	YES

Policy to eliminate industrially produced trans fatty acids	Policy to reduce the impact of marketing of foods and beverages high in saturated fats, trans fatty acids, free sugars, or salt on children	Opeational policy, strategy, or action plan to reduce unhealthy diet related to non-communicable diseases	Opeational, multisectoral policy, strategy or action plan for non-communicable diseases	Opeational policy, strategy or action plan for diabetes
YES	YES	YES	YES	YES

EL SALVADOR

Government/public sector programs for fortification of foods

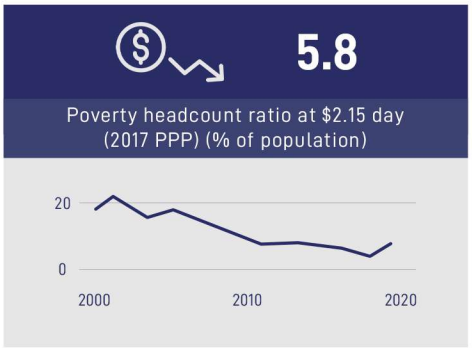
Food product	Fortificant nutrients	Mandatory	Non mandatory
Salt	iodine	x	
Wheat flour	folate, iron, nniacin (B_3), riboflavin (B_2), thiamin (B_1), Vitamin D	x	
Maize flour			x
Rice			x
oil			x

Fortification of specific foods

NAME OF PRODUCT	FORTIFICANT NUTRIENTS	TARGET POPULATION
Bienestarina	Vitamins A, D, C, B1, B2, B3, B6, B12, folic acid, Iron, zinc, calcium, copper, n-3 fatty acids	Children 6 –36 months
Fortified milk and biscuits	folic acid, iron, zinc	Children 6 –59 months

PERÚ

Poverty



Global Hunger Index for children under 5 2022:

Low 7.6

Burden of malnutrition

According to the 2022 Global Nutrition Report, Peru is:

- On course in achieving the target for stunting, but there are still children affected, with numbers higher than the average for Latin America. Also on course for the target of wasting, with a lower prevalence than the average for Latin America and among the lowest in the world.

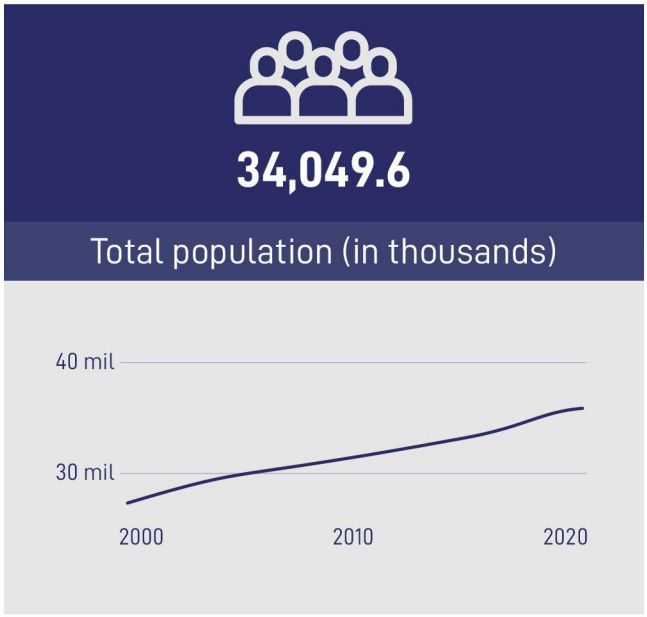
- On course for the prevention of the increase in the prevalence of overweight children under 5 years of age.

- No progress in reducing anaemia among women of reproductive age.

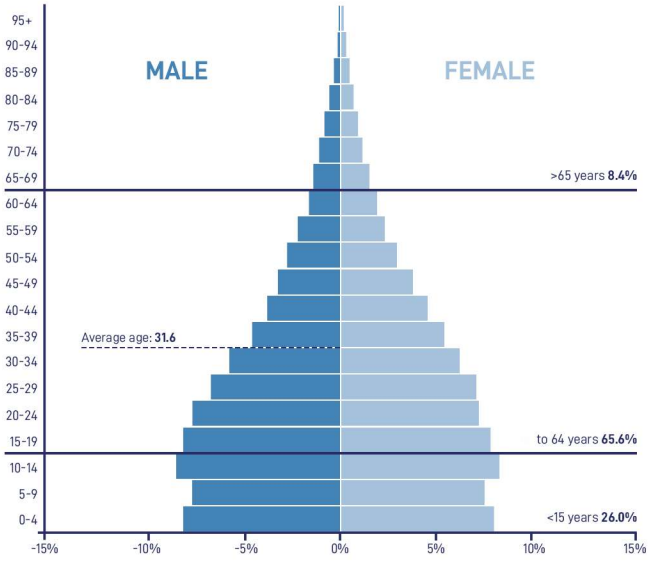
- Limited progress in achieving the diet-related non-communicable disease targets.

- No progress in achieving the target for obesity of adults, however, Peru's obesity prevalence is lower than the regional average.Mexico's obesity prevalence is higher than the regional average and among the highest in the world.

Total population



Demographics



PERÚ

Nutrition indicators

AGE	INDICATOR	% PREVALENCE	YEAR
Children <5 years	Stunting Wasting Overweight	10.8 0.4 8.0	2020
Adolescents 10-19 years	Obesity	64.4	2016
Adults	Overweight + obesity	57.5	2016

The prevalence of undernourishment has tended to rise in recent years by more than 3 percentage points, with reductions in the prevalence of stunting greater than 50 percent over recent years.
On the other side, Peru has reduced the prevalence of overweight in children under five years between 2000 and 2020.

Prevalence of micronutrient deficiencies

NUTRIENT	AGE	INDICATOR	% PREVALENCE	YEAR
Iron	Children <5 years	Deficiency	29.6	2018-19[6]
	Pregnant women	Anemia	27.1	2019
	Women of reproductive age	Anemia	20.6	2012[6]
Vitamin A	Children <5 years	Deficiency Night blindness	14.9 0.7	2005 2005
	Pregnant women	Deficiency Night blindness	1.7 6.5	2005 2005
Zinc	Total Population	Deficiency	16.9	2005

Peru has achieved a reduction of more than 30 percent in the prevalence of anemia in women of reproductive age.

PERÚ

Hidden Hunger Index for children under 5 2009
21.7

Food insecurity
Moderate to severe food insecurity affects 47.8% of the population, showing an increase of 2.9 percentage points.

Adequacy of dietary intakes of key foods in adults aged 20 years and over

FOOD GROUP	% DIETARY RECOMMENDATIONS		
	BELOW	ACCORDINGLY	ABOVE
Fruits	32		114
Vegetables	34		
Legumes	29		
Nuts	28		
Whole grains			
Fish			153
Dairy			128
Red meat			>200

National Nutrition Policies

Food-based dietary guidelines	Legislation for mandatory salt iodisation	Sugar-sweetened beverage tax	Policy to reduce salt/sodium consumption	Policy to limit saturated fatty acid intake
YES	YES	YES	YES	YES

Policy to eliminate industrially produced trans fatty acids	Policy to reduce the impact of marketing of foods and beverages high in saturated fats, trans fatty acids, free sugars, or salt on children	Opeational policy, strategy, or action plan to reduce unhealthy diet related to non-communicable diseases	Opeational, multisectoral policy, strategy or action plan for non-communicable diseases	Opeational policy, strategy or action plan for diabetes
YES	YES	YES	YES	YES

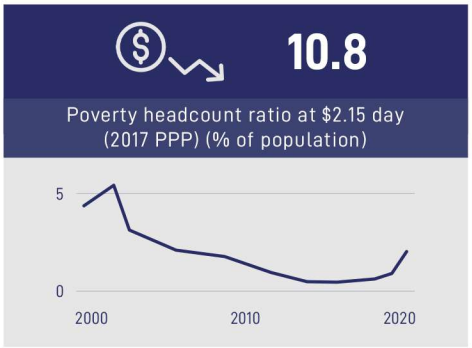
PERÚ

Government/public sector programs for fortification of foods

Food product	Fortificant nutrients	Mandatory	Non mandatory
Salt	iodine	x	
Wheat flour	folate, iron, nniacin (B_3), riboflavin (B_2), thiamin (B_1), Vitamin D	x	
Maize flour	folate, iron, nniacin (B_3), riboflavin (B_2), thiamin (B_1), Vitamin D	x	
Rice	vitamin B_6, vitamin B_{12}, folate, iron, niacin (B_3), thiamin (B_1), vitamin A, vitamin D, zinc	x	x
oil			x

COLOMBIA

Poverty



Global Hunger Index for children under 5 2022:
low 7.6

Burden of malnutrition

According to the 2022 Global Nutrition Report, Colombia is:

- Some progress in achieving the target for stunting and wasting which are higher than the average for Latin America.

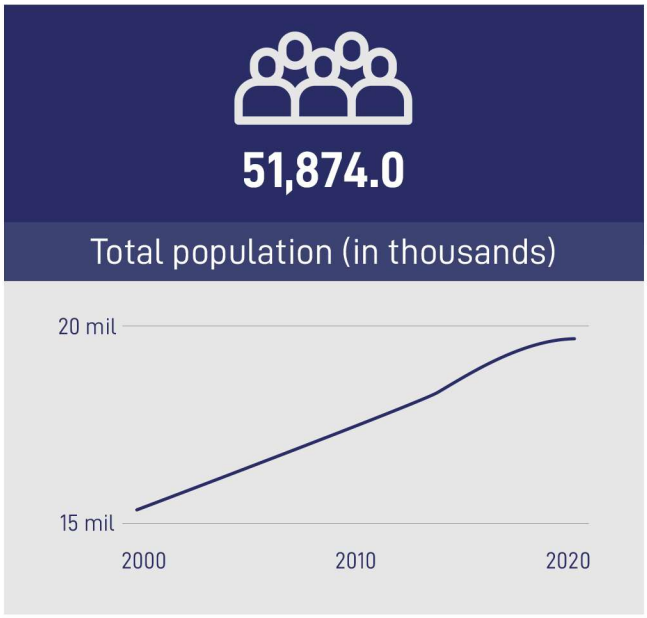
- On course for the prevention of the increase in the prevalence of overweight children under 5 years of age.

- Some progress in reducing anaemia among women of reproductive age.

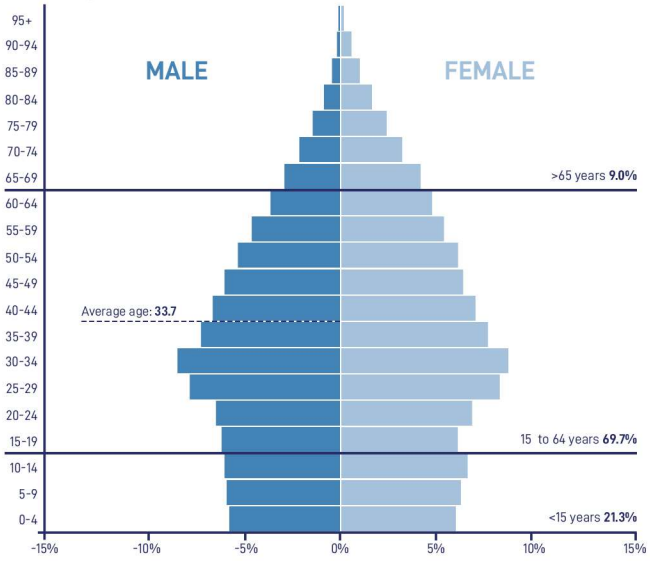
- Limited progress in achieving the diet-related non-communicable disease targets.

- No progress in achieving the target for obesity in adults, however, Colombia's obesity prevalence is lower than the regional average.

Total population



Demographics



COLOMBIA

Nutrition indicators

AGE	INDICATOR	% PREVALENCE	YEAR
Children <5 years	Stunting Wasting Overweight	1.5 N/A 5.8	2020
Adolescents 10-19 years	Obesity	6.1	2016
Adults	Overweight + obesity	59.0	2016

The prevalence of undernourishment has tended to rise in recent years.

Prevalence of micronutrient deficiencies

NUTRIENT	AGE	INDICATOR	% PREVALENCE	YEAR
Iron	Children <5 years	Deficiency	22.2	2010[6]
	Pregnant women	Anemia	21.8	2019
	Women of reproductive age	Anemia	21.2	2019
Vitamin A	Children <5 years	Deficiency Night blindness	5.9 0.6	2010[6] 2005
	Pregnant women	Deficiency Night blindness	2.0 4.1	2005 2005
Zinc	Children <5 years	N/A	N/A	N/A
	Total Population	Deficiency	10.7	2005
Vitamin B_{12}	Children <5 years	Deficiency	5.9	2013-16[6]

Colombia has achieved a reduction of more than 30 percent in the prevalence of anaemia in women of reproductive age.

Hidden Hunger Index for children under 5 2009

11.7

Food insecurity

No data available

COLOMBIA

Adequacy of dietary intakes of key foods in adults aged 20 years and over

FOOD GROUP	% DIETARY RECOMMENDATIONS		
	BELOW	ACCORDINGLY	ABOVE
Fruits	50		
Vegetables	32		
Legumes	53		
Nuts			181
Whole grains	32		
Fish			144
Dairy	68		
Red meat			>200

National Nutrition Policies

Food-based dietary guidelines	Legislation for mandatory salt iodisation	Sugar-sweetened beverage tax	Policy to reduce salt/sodium consumption	Policy to limit saturated fatty acid intake
YES	YES	YES	YES	YES

Policy to eliminate industrially produced trans fatty acids	Policy to reduce the impact of marketing of foods and beverages high in saturated fats, trans fatty acids, free sugars, or salt on children	Opeational policy, strategy, or action plan to reduce unhealthy diet related to non-communicable diseases	Opeational, multisectoral policy, strategy or action plan for non-communicable diseases	Opeational policy, strategy or action plan for diabetes
YES	YES	YES	YES	YES

COLOMBIA

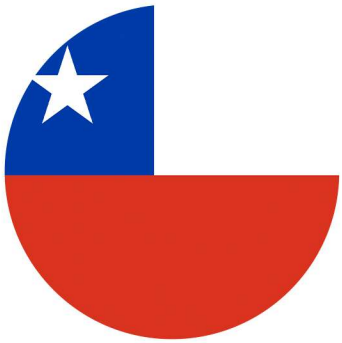
Government/public sector programs for fortification of foods

Food product	Fortificant nutrients	Mandatory	Non mandatory
Salt	iodine	x	
Wheat flour	folate, iron, nniacin (B_3), riboflavin (B_2), thiamin (B_1), Vitamin D	x	
Maize flour			x
Rice			x
oil			x

Fortification of specific foods

NAME OF PRODUCT	FORTIFICANT NUTRIENTS	TARGET POPULATION
Bienestarina	Vitamins A, D, C, B1, B2, B3, B6, B12, folic acid, Iron, zinc, calcium, copper, n-3 fatty acids	Children 6 –36 months
Fortified milk and biscuits	folic acid, iron, zinc	Children 6 –59 months

CHILE



Poverty

Global Hunger Index for children under 5 2022:
low <5

Burden of malnutrition

According to the 2022 Global Nutrition Report, Chile is:

- On course for stunting and wasting, which is lower than the average for Latin America.

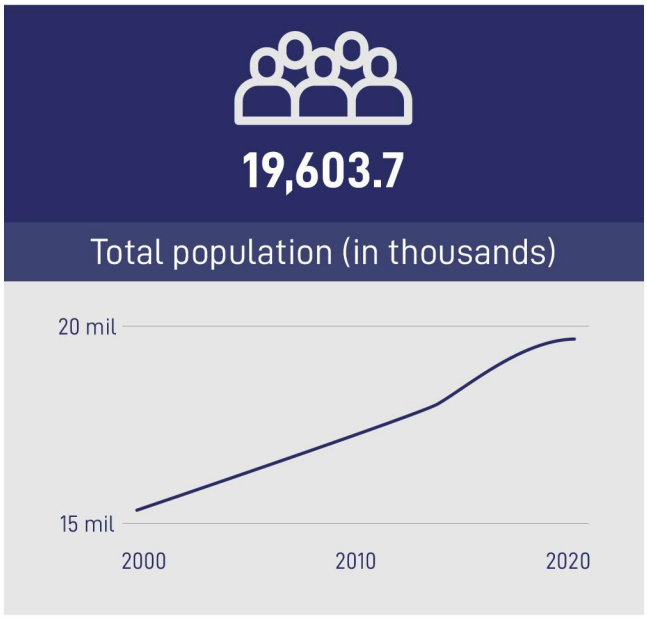
- On course for the prevention of the increase in the prevalence of overweight children under 5 years of age.

- No progress in reducing anaemia among women of reproductive age.

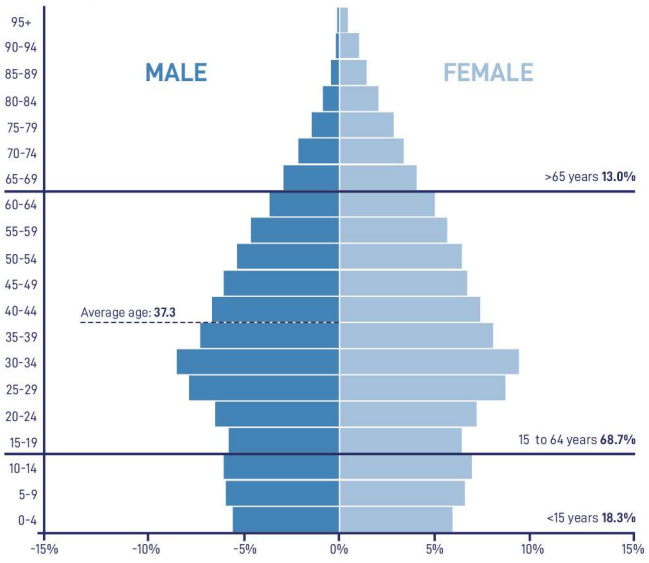
- Limited progress in achieving the diet-related non-communicable disease targets.

- No progress in achieving the target for obesity of adults.

Total population



Demographics



[1] Pan American Health Organization/World Health Organization. Core Indicators Portal. Washington D.C: Published on September 26, 2022. Available from: https://opendata.paho.org/en/core-indicators.

CHILE

Nutrition indicators

AGE	INDICATOR	% PREVALENCE	YEAR
Children <5 years	Stunting Wasting Overweight	1.6 N/A 9.8	2020
Adolescents 10-19 years	Obesity	13.6	2016
Adults	Overweight + obesity	63.1	2016

Chile has one of the lowest prevalences of stunting in Latin America, below 5 percent.
On the other side, Chile has reduced the prevalence of overweight in children under five years between 2000 and 2020.

Prevalence of micronutrient deficiencies

NUTRIENT	AGE	INDICATOR	% PREVALENCE	YEAR
Iron	Children <5 years	Deficiency	14	2010[6]
	Pregnant women	Anemia	19.4	2019
	Women of reproductive age	Anemia	8.7	2019
Vitamin A	Children <5 years	Deficiency Night blindness	19 0.6	2010[6] 2005
	Pregnant women	Deficiency Night blindness	2.4 3.4	2005 2005
Zinc	Children <5 years	Deficiency	39	2010[6]
	Total Population	Deficiency	5.7	2005

Chile has one of the lowest levels of prevalence of anaemia in women of reproductive age.

Hidden Hunger Index for children under 5 2009

8.3

Food insecurity

The prevalence of moderate or severe food insecurity is 17.9%, with an increase of 7 percentage points since 2014.

CHILE

Adequacy of dietary intakes of key foods in adults aged 20 years and over

FOOD GROUP	% DIETARY RECOMMENDATIONS		
	BELOW	ACCORDINGLY	ABOVE
Fruits	54		
Vegetables	47		
Legumes	13		
Nuts	72		
Whole grains	32		
Fish	50		
Dairy			155
Red meat			133

National Nutrition Policies

Food-based dietary guidelines	Legislation for mandatory salt iodisation	Sugar-sweetened beverage tax	Policy to reduce salt/sodium consumption	Policy to limit saturated fatty acid intake
YES	YES	YES	YES	YES

Policy to eliminate industrially produced trans fatty acids	Policy to reduce the impact of marketing of foods and beverages high in saturated fats, trans fatty acids, free sugars, or salt on children	Opeational policy, strategy, or action plan to reduce unhealthy diet related to non-communicable diseases	Opeational, multisectoral policy, strategy or action plan for non-communicable diseases	Opeational policy, strategy or action plan for diabetes
YES	YES	YES	YES	YES

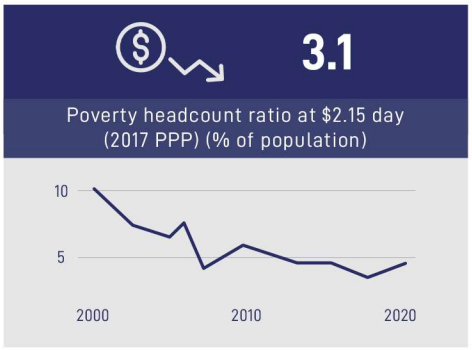
CHILE

Government/public sector programs for fortification of foods

Food product	Fortificant nutrients	Mandatory	Non mandatory
Salt	iodine	x	
Wheat flour	folate, iron, nniacin (B_3), riboflavin (B_2), thiamin (B_1), Vitamin D	x	
Maize flour			x
Rice			x
oil			x

MÉXICO

Poverty



Global Hunger Index for children under 5 2022:
low 8.1

Burden of malnutrition

According to the 2022 Global Nutrition Report, Mexico is:

- Some progress in achieving the target for stunting and wasting, but there are still children affected, which are higher than the average for Latin America.

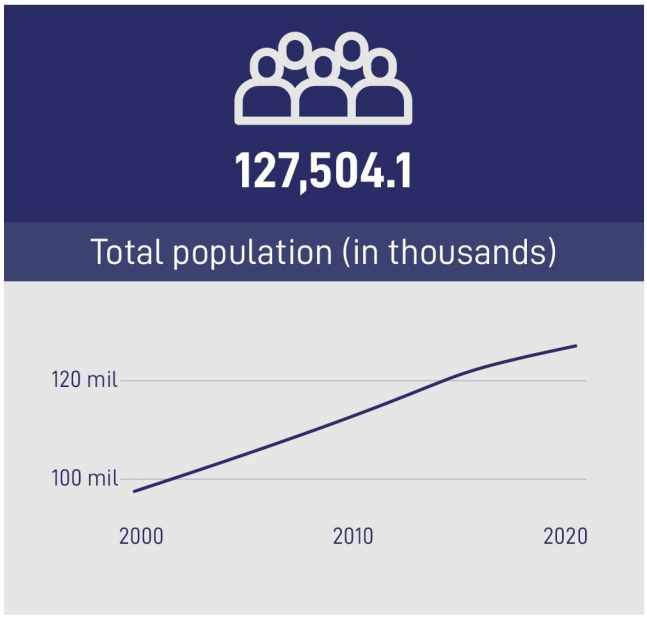
- On course for the prevention of the increase in the prevalence of overweight children under 5 years of age.

- Some progress in reducing anaemia among women of reproductive age.

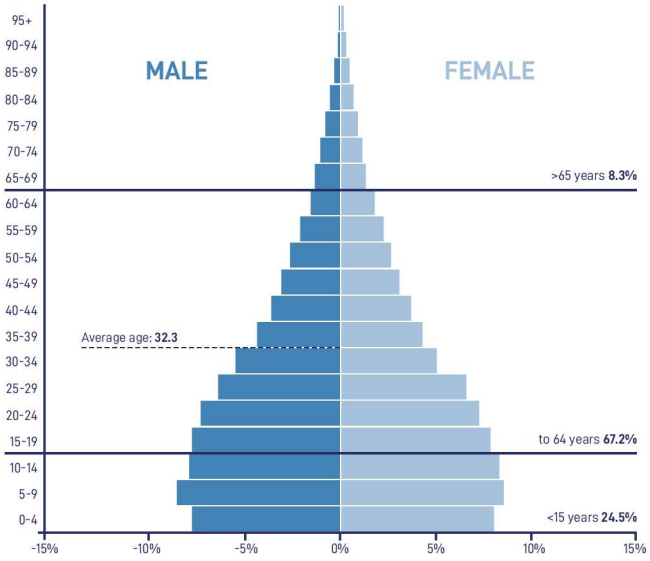
- Limited progress in achieving the diet-related non-communicable disease targets.

- No progress in achieving the target for obesity of adults, however Guatemala's obesity prevalence is lower than the regional average.

Total population



Demographics



MÉXICO

Nutrition indicators

AGE	INDICATOR	% PREVALENCE	YEAR
Children <5 years	Stunting Wasting Overweight	12.1 1.6 6.3	2020
Adolescents 10-19 years	Obesity	13.5	2016
Adults	Overweight + obesity	64.9	2016

The prevalence of undernourishment has tended to rise in recent years by 2.8 percentage points.
On the other side, Mexico has reduced the prevalence of overweight in children under five years between 2000 and 2020.

Prevalence of micronutrient deficiencies

NUTRIENT	AGE	INDICATOR	% PREVALENCE	YEAR
Iron	Children <5 years	Deficiency	17.0	2018-19[6]
	Pregnant women	Anemia	20.2	2019
	Women of reproductive age	Anemia	43.0	2012[6]
Vitamin A	Children <5 years	Deficiency Night blindness	26.0 0.6	2018-19[6] 2005
	Pregnant women	Deficiency Night blindness	1.9 3.8	2005 2005
	Women of reproductive age	Deficiency	-	-
Zinc	Children <5 years	Deficiency	13.0	2018-19[6]
	Total Population	Deficiency	16.9	2005
Vitamin B_{12}	Children <5 years	Deficiency	1.0	2018-19[6]
	Women of reproductive age	Deficiency	2.0	2012[6]
Vitamin D	Woman of reproductive age	Deficiency	8.0	2018-19[6]

Mexico has achieved a reduction of more than 30 percent in the prevalence of anaemia in women of reproductive age.

MÉXICO

Hidden Hunger Index for children under 5 2009
18.0

Food insecurity
The prevalence of moderate or severe food insecurity is 26.1%, and figures have increased by 3.5 percentage points in recent years.

Adequacy of dietary intakes of key foods in adults aged 20 years and over

FOOD GROUP	% DIETARY RECOMMENDATIONS		
	BELOW	ACCORDINGLY	ABOVE
Fruits	75		
Vegetables	65		
Legumes	48		
Nuts	7		
Whole grains	4		
Fish	28		
Dairy			148
Red meat			>200

National Nutrition Policies

Food-based dietary guidelines	Legislation for mandatory salt iodisation	Sugar-sweetened beverage tax	Policy to reduce salt/sodium consumption	Policy to limit saturated fatty acid intake
YES	YES	YES	YES	YES

Policy to eliminate industrially produced trans fatty acids	Policy to reduce the impact of marketing of foods and beverages high in saturated fats, trans fatty acids, free sugars, or salt on children	Opeational policy, strategy, or action plan to reduce unhealthy diet related to non-communicable diseases	Opeational, multisectoral policy, strategy or action plan for non-communicable diseases	Opeational policy, strategy or action plan for diabetes
YES	YES	YES	YES	YES

MÉXICO

Government/public sector programs for fortification of foods

Food product	Fortificant nutrients	Mandatory	Non mandatory
Salt	iodine	x	
Wheat flour	folate, iron, nniacin (B_3), riboflavin (B_2), thiamin (B_1), Vitamin D	x	
Maize flour	folate, iron, nniacin (B_3), riboflavin (B_2), thiamin (B_1), Vitamin D	x	
Rice			x
oil			x

MALNUTRITION BURDEN

Although it performs well against other developing countries. Mexico still experiences a malnutrition burden among its under-five population. As of 2016. the national prevalence of under-five overweight is 5.3%, which has increased slightly from 5.2% in 2015. The national prevalence of under-five stunting is 10%. which is less than the developing country average of 25%. Mexico's under-five wasting prevalence of 2% is also Less than the developing country average of 8.9%. Mexico's adult population also face a malnutrition burden. 14.6% of women of reproductive age have anemia, and 11.4% of adult women have diabetes, compared to 9.1% of men. Meanwhile, 40.2% of women and 30.5% of men have obesity

Table 1. % Prevalence of malnutrition[3]

AGE	INDICATOR	% PREVALENCE		YEAR
		MALE	FEMALE	
< 5 years	Stunting	10.07	10.07	2016
	Wasting	2.6	2.6	2016
	Overweight	5.3	5.3	2016
Child and adolescent (5-19) years	Underweight	9.7	10.07	2016
	Overweight	35.8	2.6	2016
	Obesity	16.8	5.3	2016
Adult (20 and more)	Anemia in WRA	X	14.6	2016
	Diabetes	9.1	11.4	2014
	Overweight	42.5	36.6	2016
	Obesity	30.5	40.2	2016

VITAMIN AND MINERAL DEFICIENCIES

Table2. Prevalence of micronutrient deficiencies

Recommended Dietary Allowances	Prevalence of micronutrient deficiency	Health issues related to deficiencies	Current strategies to address deficiencies	Promising strategies	Reference
IRON					
8 mg	Children (6-11 years) 13%	Iron deficiency with potential adverse impact on growth, cognitive development and development of human capital.	Fortification of wheat flour with iron (40 mg-kg).	Coverage extension programs that include NGO and public-private alliances.	Encuesta Nacional de Salud en Escolares 2008. ENSANUT 2006 y 2012.
11 mg men 15 mg women	Teenagers (12-19 years) 11%				
8 mg	Anemia in men (20-49 years) 6%				
18 mg	Anemia in women (20-49 years) 19%				
8 mg	Anemia in elderly men (50 and more) 10-30%				
8 mg	Anemia in elderly women (50 and more 28-50%				
ZINC					
5-8 mg	Children (6-11 years) 26%	Child growth failure; morbidity and cognitive development; human capital.	Fortification of wheat flour with iron (40 mg-kg).	Limited impact of educational strategies on the use of complementary foods.	Encuesta Nacional de Salud en Escolares 2008.

VITAMIN B12

2.4 mcg	Women (20-49 years) 8.5%	Deficiency is associated with macrocytic anemia.	There are no national vitamin B12 food fortification programs.	Complementary foods of social programs, based on flours.	Prevalence of iron, folate and vitamin B12 deficiencies in 20 to 49 year old women: Ensault 2012

VITAMIN D

12 mg (600 IU)	Children (6-11 years) 36.6%	Vitamin D sufficiency prevents rickets in children and osteomalacia un adults. Together with calcium vitamin D also helps protect older adults from osteoporosis.	Fortifies milk and powder products.	Sun exposure. Consumption of fortified dairy products.	Vitamin D deficiency is common and is associated with over-weight in Mexican children aged 1-11 years

POLICY TITLE	START YEAR
Sin Hambre, Cruzada Nacional	2018
Marco de Cooperacion de las Naciones Unidas para el Desarrollo en Mexico	2014
NORMA Oficial Mexicana NOM-247-SSA1-2008, Productos y servicios. Cereales y sus productos.	2008

PROGRAMME TITLE AND ACTIONS	START YEAR
Vitamin and mineral nutrition - Complementary food fortification	2009
Vitamin and mineral nutrition - Condiment an dseasonings fortification	2009
Vitamin and mineral nutrition - Lodine supplementation	2009
Vitamin and mineral nutrition - Margarine/butter fortification	2009

Nutrients Added Through Fortification (parts per million)[4]

Cereals	Vitamins & Minerals							
	Iron	Type of Iron	Zinc	Folic Acid	B12	Niacin	Rivoflamin	Thiamin
Wheat	40	Ferrous sulfate Ferrous fumarate	40	2	-	35	3	5
Maize	40	Ferrous sulfate Ferrous fumarate	40	2	-	35	3	5

Technical analysis

	Cereals	Vitamins & Minerals							
		Iron	Type of Iron	Zinc	Folic Acid	B12	Niacin	Rivoflamin	Thiamin
Current	Wheat	40	Ferrous sulfate Ferrous fumarate	40	2	-	35	3	5
Proposal	Maize	60	-	40	-	0.0035	-	-	-

A **Fortification of wheat flour with Iron**

Flour fortification with zinc can lead to a massive diminution of this mineral deficiency.

B **Multifortification of weath flour with Iron, Zinc.**

Flour fortification with zinc and iron can address children (6-11) deficiencies.

C **Fortification of wheat flour Iron and vitamin B12**

Flour fortification with zinc and vitamin B12 can address women (20-49 years) deficiencies.

D **Fortification of maize flour**

Options A, B and C should also be considered on maize flour.

GLOSSARY

Global Hidden Hunger Index

Since there are a range of micronutrient deficiencies and nutritional outcomes we can measure, it is difficult to distill the severity of micro-malnutrition into a single measure. One metric which has been developed to give an indication of the severity of this is the Global Hidden Hunger Index (GHHI). Note that the terms 'hidden hunger' and 'micronutrient deficiency' are often used interchangeably. GHHI is most commonly used to assess the nutritional status of pre-school children (under the age of five) and is calculated as the average of three nutritional indicators in pre-school children: the prevalence of stunting (children who are too short for their age); the anemia; and vitamin-A deficiency.

Global Hunger Index

Is a tool for comprehensively measuring and tracking hunger at global, regional, and national levels over recent years and decades. GHI scores are calculated based on a formula combining four indicators that together capture the multidimensional nature of hunger, reflecting both the quantity and quality of food and diets. The four indicators underlying GHI scores—undernourishment, child stunting, child wasting, and child mortality—reflect deficiencies in calories (quantity) as well as in important micronutrients (quality).

REFERENCES

• Byrd-Bredbenner C., Moe G., Berning J., Kelly D. (2016), Wardlaw s Perspectives of Nutrition. Updated with 2015–2020 Dietary Guidelines for Americans. New York, NY, USA. McGraw-Hill Education.
• Committee on World Food Security (2020). Impacts of COVID-19 on food security and nutrition: developing effective policy responses to address the hunger and malnutrition pandemic. Recovered from: https:// www.fao.org/3/cb1000en/cb1000en.pdf
• Definición de suplementación: National Cancer Institute (s.f.). Supplemental Nutrition. Recovered from: https://www.cancer.gov/publications/dictionaries/cancer-terms/def/supplemental-nutrition
• Flores, A., Flores, M., Macias, N., Hernandez-Barrera, L., Riversa, M., Contreras, A., &Villalpando, S. (2017). Vitamin D deficiency is common and is associated with overweight in Mexican children aged 1-11 years. Public Health Nutrition, 20(10), 1807-1815.doi:10.1017 /S1368980017000040
• Food and Agriculture Organization of the United Nations /World Health Organization. (2001). Human Vitamin and Mineral Requirements. Report of a joint FAD/WHO expert consultation. Recovered from: https://www.fao.org/3/ y2809e/y2809e.pdf
• Food and Agriculture Organization of the United Nations (2014) Understanding the true cost of malnutrition Recovered from: https://www.fao.org/zhc/detail-events/en/c/238389/
• Gutiérrez JP, Rivera-Dommarco J, Shamah-Levy T, Villalpando-Hernández S, Franco A, Cuevas-Nasu L, Romero-Martínez M, Hernández-Ávila M. Encuesta Nacional de Salud y Nutrición 2012. Resultados Nacionales. Cuernavaca, México: Instituto Nacional de Salud Pública (MX), 2012
• Global Nutrition Report (2021). Country Nutrition Profile-Mexico. Recovered from: https:// globalnutritionreport.org/resources/nutrition-profiles/latin-america-and-caribbean/central-america/Mexico/ #profile
• Miranda C, Daisy, Leiva B, Laura, León S, José Pablo, & de la Maza C, Ma Pía. (2009). DIAGNÓSTICO Y TRATAMIENTO DE LA DEFICIENCIA DE VITAMINA D. Revista chilena de nutrición, 36(3), 269-277. https:// dx.doi.org/10.4067/S0717-75182009000300009
• National Institute of Health (2022). Zinc. Recovered from: https://ods.od.nih.gov/factsheets/Zinc- HealthProfessional/
• NORMA Oficial Mexicana NOM-247-SSAl-2008, Productos y servicios. Cereales y sus productos. Cereales, harinas de cereales, sémolas o semolinas o sus mezclas. Productos de panificación. Disposiciones y especificaciones sanitarias y nutrimentales. Métodos de prueba.
• Olaiz-Fernández G, Rivera-Dommarco J, Shamah-Levy T, Rojas R, Villalpando-Hernández S, Hernández-Avila M, Sepúlveda-Amor J. Encuesta Nacional de Salud y Nutrición 2006. Cuernavaca: Instituto Nacional de Salud Pública, 2006. Recovered from: https://ensanut.insp.mx/informes/ensanut2006.pdf
• Organización Mundial de la Salud (2009) Recomendaciones sabre la fortificación de las harinas de trigo y de maíz. Informe de reunión. Declaración de consenso provisional. Recovered from: https://apps.who.int/iris/ bitstream/handle/10665/111839/WHO_NMH_NHD_MNM_09.1_spa.pdf?sequence=1&isAllowed=y
• Population Pyramid net (2019) Mexico. Recovered from: https://ww.populationpyramid.net/Mexico/2019/
• Shamah-Levy T, Vielma-Orozco E, Heredia-Hernández O, Romero-Martínez M, Mojica-Cuevas J, Cuevas-Nasu L, Santaella-Castell JA, Rivera-Dommarco J. Encuesta Nacional de Salud y Nutrición 2018-19: Resultados Nacionales. Cuernavaca, México: Instituto Nacional de Salud Pública, 2020
• Siddiqee, M.H., Bhattacharjee, B., Siddiqi, U.R. et al. High prevalence of vitamin D deficiency among the South Asian adults: a systematic review and meta-analysis. BMC Public Health 21, 1823 (2021). https:// doi.org/10.1186/s12889-021-11888-1
• The World Handbook (2022) Explore all countries- Mexico. Recovered from: https://www.cia.gov/library / publications/the-world-factbook/geos/ mx.html
• World Health Organization (2017), Malnutrition: It's about more than hunger. Recovered from: https:// www.who.int/news-room/commentaries/detail/malnutrition-it-s-about-more-than-hunger
• World Health Organization (2020) World Health Statistics 2020. Recovered from: https://www.who.int/data/ gho/publications/world-health-statistics2020.
• World Health Organization (2021). Malnutrition. Recovered from: https://www.who.int/news-room/fact-sheets/detail/malnutrition
• World Health Organization (2021). Obesity and overweight. Recovered from: https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight


BNUTRITION
GRUPO BIMBO